WEEDS and TURF
PEST CONTROL

A SECTION OF PEST CONTROL MAGAZINE

DECEMBER 1962

Control of Insects and Mites on Ornamentals

By DR. L. C. KUITERT
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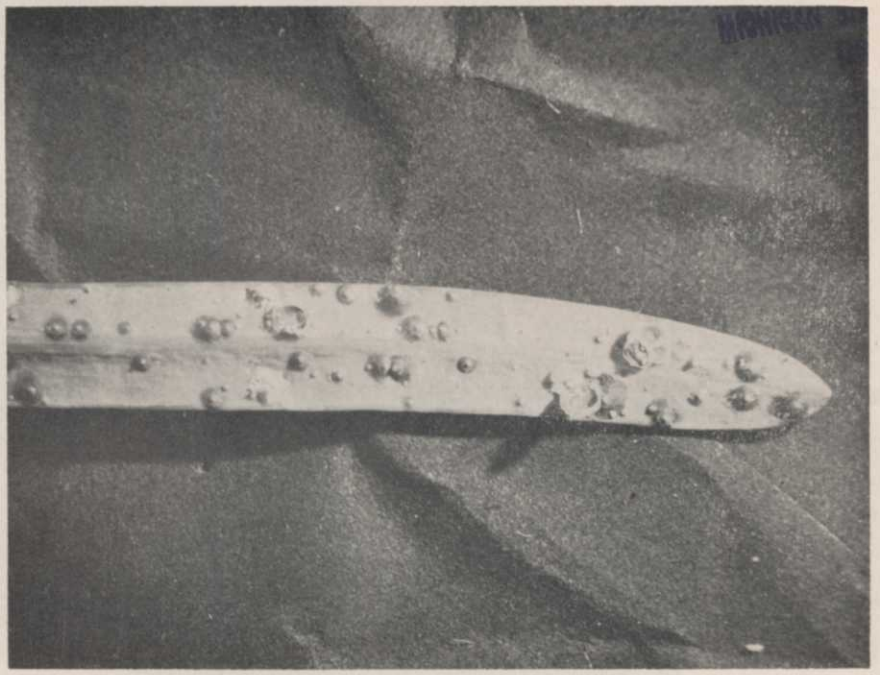
PRESENT INTEREST in growing ornamental plants has created a demand for information on the control of the insects, mites and other pests attacking them. Requests for this information come from home gardeners, florists, nurseries and contract applicators. Until recently very little attention was given the problem since there was no satisfactory way of estimating monetary losses of ornamentals due to insect depredations.

Ornamental plants are subject to attack by many species of insects. To maintain shrubs and trees in a healthy, attractive condition it is usually necessary to protect them from insect pests. Because many of the newer insecticides are often specific in controlling insects it is important to learn how to recognize the specific pest. This is helpful to understand the actual importance of the insect and to decide on the best measures for control. The following information is intended to serve only as a guide to help combat some of the general insect problems. It is not possible to include a long list of specific insects or the list of host plants.

Whenever ants are observed in numbers on a plant one should suspect the presence of soft scales, mealybugs, aphids or whiteflies. These sucking insects excrete a sweet liquid called "honeydew" which is attractive to ants. This sticky material is unsightly and makes an excellent medium for the development of a black fungus called "sooty mold." The presence of this fungus also should cause one to suspect that the plant is infested with one of these insects. This fungus retards the growth of the plants to some extent by reducing light, thus interfering with



Armor has been removed from some of these Florida red scales shown here on podocarpus.

Armored scales, like those on this rose twig, secrete a waxy coating resembling "armor."

Aphids, often called "plant lice," also infest roses and are important to CAs.

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photosynthesis. Sooty mold usually weathers away following control of insect infestations.

THE INSECTS

Scale Insects

Scale insects are serious pests of many ornamental trees and shrubs. Scales are so different from the usual concept of insects that they are often mistaken for fungus growths. Scale insects have sucking mouthparts and feed on plant juices. They are quite small and occasionally become so numerous that they literally coat the leaves and twigs. Heavily infested plants appear unhealthy and produce very little new growth. The foliage develops chlorotic areas and may drop prematurely and portions of twigs and branches may be killed. Scales may be divided into the armored scales and soft scales for convenience.

Armored scales secrete a waxy, hardened, protective covering called a scale or armor which is not an integral part of the insect's body. The tiny scale may be circular, semicircular, oblong or pear-shaped. Adult females vary from about 1/12 to 1/8 inch in diameter or length. In the soft scales the waxy secretion is an integral part of the insect's body. Some of the soft scales are covered with a waxy, cottony material while others are naked. These scales are larger than the armored scales and vary from 1/12 to 1/3 inch in length.

In some species of scale insects a single female may deposit several hundred eggs. The young scale, known as a crawler, is usually broadly oval in shape, flattened,

Another important pest is the "oyster shell" scale, pictured here on a camellia leaf.

Cottony cushion scales are also known as mealybugs, attack such plants as this pittosporum.

and bright yellow. This stage has the ability to crawl and move about freely. The crawler moves out over the plant to the succulent new growth, selects a place to settle, inserts its mouthparts into the plant tissue and, in the case of the female, remains there for the rest of its life. Usually there are several overlapping generations a year. Due to the waxy protective covering and the sedentary habit it is essential that insecticidal sprays be applied thoroughly and completely.

Mealybugs

Mealybugs are soft-bodied insects closely related to the scale insects and are usually covered with a powdery or cottony, waxlike material. They have sucking mouthparts and are important pests of annuals and perennials as well as the woody ornamentals. They vary from 1/5 to 1/3 inch in length when mature. With a few exceptions mealybugs retain the ability to move about throughout their lives.

Whiteflies

Whiteflies restrict their feeding to foliage, and nearly always are found on the lower surface. Both adult and immature stages suck plant juices. Heavy feeding sometimes gives the infested leaves an unhealthy appearance and may cause the leaves to turn yellow and die.

Adult whiteflies are tiny creatures about 1/16 inch in length and resemble tiny white moths. They have 4 wings which, with the top of the body, are covered with a white, powdery wax giving the insects their common name. The immature stage looks somewhat like scale insects and they remain attached to the leaf until the adult emerges. They are about the size of a small pinhead, oval, flattened, and light green in color.

Aphids

Aphids, or plant lice, are well-known insects that infest nearly all ornamentals. They are soft-bodied insects about 1/8 inch in length and injure plants by sucking the juices. They are most commonly found in colonies on the new growth; their feeding causes the leaves to curl and become distorted and the buds and flowers to be malformed. Aphids are usually most abundant in the spring but may be present throughout the growing season. Aphids usually are easily controlled; however, the adults are good flyers and they can readily reinfest plants, making repeated applications necessary on occasion.

Thrips

Thrips are important pests of quite a few trees and shrubs. They are slender, very small insects about 1/25 inch in length. Thrips

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feed by puncturing the leaf surface and then sucking the juices. Their feeding results in a stippling of the leaf surface. This may be accompanied by premature defoliation. Feeding in flowers causes a blotching and streaking on the petals. The presence of thrips on foliage also may be recognized by the small brown or black varnishlike spots of excrement which they leave where they feed.

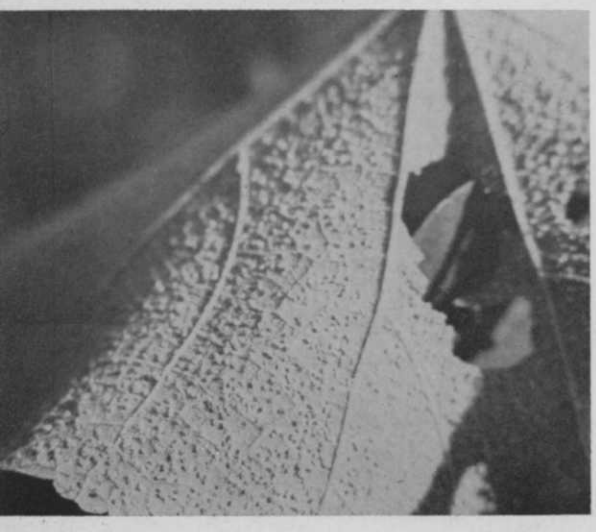
Leaf Miners

Leaf miners, such as the azalea leaf miner, holly leaf miner, and serpentine leaf miner, although not usually serious pests, tunnel within the leaves and render foliage unsightly. The azalea leaf miner is a yellowish caterpillar about 1/2 inch when grown. The young caterpillar feeds between the leaf surfaces while the older larva folds over the tip or edge of the leaf and feeds in this protected area, leaving a brownish blister. The adult is a small moth. The holly and serpentine leaf miners are maggots and also feed between the leaf surfaces. The adults are tiny black flies. Usually leaf miners appear only when the new foliage develops.

Lacebugs

Lacebugs infest the foliage of a number of plants but particularly andromeda, azalea, sycamore, oak, hawthorn, and other thorns. These beautiful insects are 1/8 inch in length, flat, and have transparent wings with a lacelike effect. They insert their needlelike mouth parts into plant tissues, usually on the underside of leaves, and suck sap. Lacebug injury can be identified by the stippled appearance of the upper surface, and the brown and black varnishlike spots of excrement and white cast skins on the lower surface.

Whiteflies restrict their feeding to foliage. This is the immature stage on hibiscus.



Grasshoppers

Grasshoppers, katydids, and tree crickets occasionally become numerous enough to be pests of some shrubs and fruit trees. These insects have chewing mouthparts and eat holes in the leaves. Damage is rarely severe although the numerous holes in the foliage are unsightly.

Caterpillars

Caterpillars are the immature stage of moths and butterflies. All caterpillars have chewing mouthparts and although only a few species are destructive, they are among the worst pests of trees and shrubs and include the bagworms, cankerworms, cutworms, tent caterpillars, and fall webworm. Caterpillars have three pairs of jointed, true legs on the front of the body and usually four pairs of unjointed soft, fleshy projections called "prolegs" on the abdomen, with a fifth pair at the end. The body is usually cylindrical and with a slender or robust shape. The large number of variations found within this group precludes a discussion of the various representatives. Because of their habits and control they can be grouped into three categories: leaf eating caterpillars, underground caterpillars and leaf miners. The latter group is discussed in the section on leaf miners.

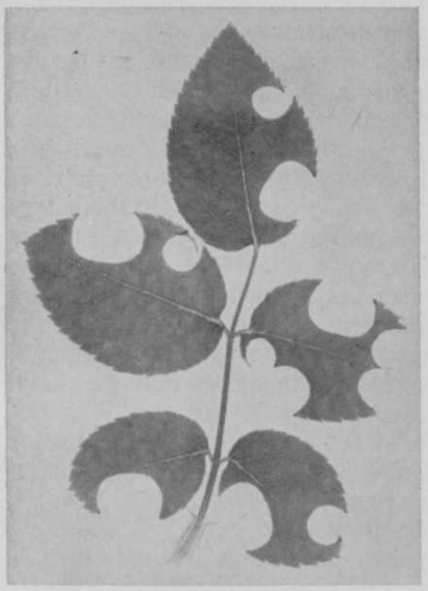
Beetles and Grubs

Frequently beetles cause injury to trees and shrubs. Both adult and immature or larval stages are injurious and both have chewing mouthparts. Adult beetles have a hard shell and vary from 1/10 to 2 inches in length.

The immature stage of most beetles is known as a grub. Usually adults feed on foliage, flowers, and fruits, while the grubs feed on foliage or roots or bore through stems. Many beetles are beneficial, the lady beetles being predacious on a variety of pests.

MITES

Spider mites, commonly called "red spiders," are frequently serious pests of woody plants. Mites are not insects but are sufficiently like them to be included here. Mites have 4 pairs of legs and are closely related to the spiders, ticks, and scorpions. The name spider mite originated from the fact that fine strands of silk similar to that of spiders are spun by many mites,



Leaves almost chewed away are typical of damage caused by leafcutting bees.

although the webs may not be detected readily.

Spider mites are extremely small; many of them being less than 1/50 inch in length. They are soft-bodied, oval-shaped, and colored yellowish, greenish, or reddish. Many species are so small that they cannot be seen without the aid of a microscope. Often their presence is not detected until they become very numerous and cause obvious plant damage. Mites have needlelike mouthparts with which they puncture the leaf and suck up plant sap and chlorophyll. Withdrawal of the chlorophyll results in a russeted or stippled condition which reduces the beauty and commercial value of the plant. Plants, such as roses, heavily infested with mites, will frequently drop an appreciable amount of foliage.

INSECTICIDES AND MITICIDES

Oil Emulsions

Use of oil emulsion sprays has been an accepted practice for control of many insects infesting trees and shrubs. Since most contract applicators are familiar with oil emulsions, only a few general comments will be made on their use for controlling pests of ornamentals.

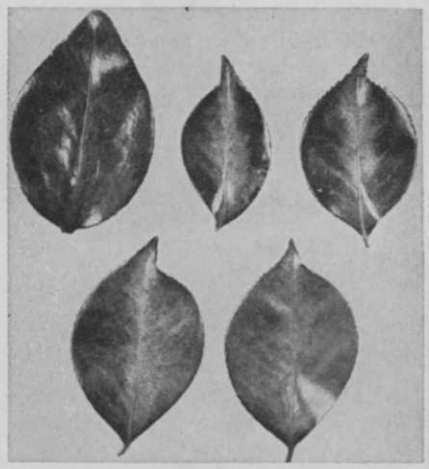
Oil emulsions should be used in

concentrations of at least 1.2% to be effective against the pests but not more then 1.6% to avoid plant injury. Oil emulsions have certain limitations and should not be applied when temperatures are likely to exceed 87-88° F., and they should not be used on plants having considerable new tender growth. The more refined oil emulsions or mayonnaise type emulsions are preferred as horticultural sprays since they are less injurious to plants.

In many instances oil emulsions are applied to shrubs and trees during the dormant season. The dormant miscible oils when diluted with water form a milklike spray mixture. Since the oil content of the miscible oils may vary they should be used as directed by the manufacturers. Oil sprays must be thoroughly mixed and continually agitated to prevent accumulations of free oil on the surface. Do not apply dormant oil sprays when the temperature is below 40° F. or when there is a possibility of freezing temperatures during the next day or two following application.

Phosphatics

Several phosphatic insecticides have appeared on the market during the past few years. In many



These camellia leaves have been damaged by mites. Upper center and right and lower leaves show moderate to severe damage.

instances they have surpassed the oil emulsions in effectiveness and in addition have the following advantages: they can be used during periods of high temperature and can be applied to tender foliage without danger of plant injury.

Parathion is extremely effective against whiteflies, aphids, cottony cushion scales, mealybugs, thrips, lacebugs, and a broad spectrum of other horticultural pests including mites. The greatest disadvantage when compared to oil emulsion, however, is its extreme toxicity to mammals including man. It is very dangerous to handle and apply. The operator of the sprayer should follow all rules prescribed by the manufacturer when using this material.

Malathion is another phosphatic compound which is effective against a broad spectrum of insect pests. This material is much safer to handle than parathion although it is not quite as effective and must be used in substantially greater concentrations. This material is effective against some mites but is not considered to be a good miticide.

Demeton (Systox). — This material is effective against many of the sucking insects and mites infesting ornamentals. It is a systemic compound and is absorbed into the plant and translocated by the sap into all portions of the plant. It is effective for extended periods, usually three to six weeks. The systemic qualities eliminate the necessity for thorough and complete spray coverage. It is not effective against most chewing insects or the insects which feed in the flowers.

Ethion is an effective insecticide which is appreciably less toxic to mammals than parathion. This material has given outstanding control of a wide range of insects and mites attacking ornamental trees and shrubs.

Chlorinated Hydrocarbons

Lindane is the essentially pure gamma isomer, almost odorless form of benzene hexachloride. It is effective against a broad spectrum of general insect pests. It is relatively nontoxic to mammals and humans. It is not effective in controlling mites.

DDT is our best known chlorinated hydrocarbon insecticide. It has performed exceptionally well against most of the chewing pests of ornamentals but is almost ineffective against sucking insects and is responsible for mite buildups in numerous situations. When using DDT as a foliage spray it is best to include a miticide to prevent mite problems.

Dieldrin is especially effective in

Lacebugs on this sycamore leaf have left excrement deposits, (small, round, black spots).

controlling many soil inhabiting insects. This material also is effective in controlling many of the chewing insects such as grasshoppers, tree crickets, immature and adult beetles, and caterpillars. It is a fairly toxic material and should be used with caution.

Miticides

Numerous miticides for use on ornamental shrubs and trees have appeared on the market during recent years. Several of the better materials include the following:

Aramite is only effective for the control of spider mites and is safe to use on a variety of ornamental plants. It is compatible with most insecticides and fungicides.

Ethion is a phosphatic material which is an excellent miticide as well as an insecticide. It has proven effective against a broad spectrum of mites and is safe to use on most ornamental plants. It is compatible with most insecticides and fungicides.

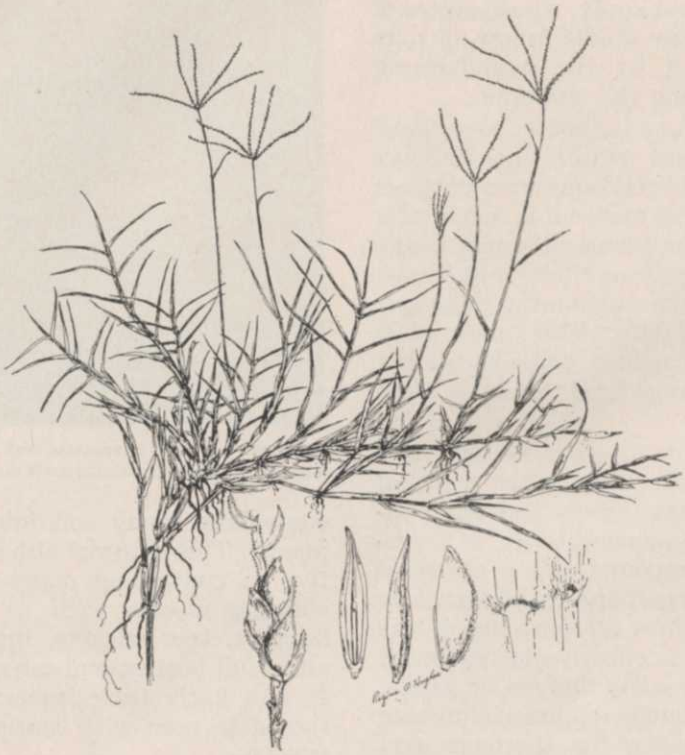
Kelthane is a chlorinated hydrocarbon related to DDT. It is effective in controlling many species of mites on a variety of plants. This material has a long residual action and is relatively harmless to insect predators and parasites.

Tedion is one of the sulfonated materials. It is effective primarily as a mite larvacide and ovicide. It is not effective in reducing adult mite populations quickly; however, it has a long residual effect. Tedion should be used in a

Know Your Species

BERMUDAGRASS

(Cynodon dactylon)



Bermudagrass, sometimes called devil grass and wire grass, is an aggressive perennial, reproducing by seeds, by rooting at the joints of stolons (creeping stems), and by rooting from the extensive rhizome system (underground stems). Due to persistent "runners," Bermudagrass forms a dense sod mat.

A weed pest in lawns, fields, and waste places, especially on sandy soil, Bermudagrass was introduced from Eurasia, where it is a forage crop, sometime before 1807. It is a major pest and pasture plant in southern United States, and is extending its range northward where it is susceptible to winter killing.

It flowers and sheds seed throughout the summer months, being somewhat similar to crabgrass in this respect. Bermudagrass differs from crabgrass in having the much more persistent stolon and rhizome systems.

Stems are flattened, gray-green, short, smooth, and creeping, becoming erect near the tips, 6 to 18 inches tall. Leaves are flattened with a fringe of whitish hairs where the leaf blade joins the sheath (the part of the leaf that encloses the stem). Flowers are borne on 3 to 5 spikes that radiate from the end of a flattened stem. Spikelets (clusters of flowers) are pressed closely together on one side of the spike. Seeds, one in each flower, are about 1/20 inch long, oval, and orange-red in color. Rootstocks are hard, scaly, sharp-pointed, and spreading.

Selective control against Bermudagrass in turf has not been developed. Certain herbicides have proved moderately effective against this serious pest, if proper timing and repeated applications are used. They are: trichloroacetic acid (TCA), Vapam, and mylone. Soil fumigation with methyl bromide under an airtight cover eradicates Bermudagrass and allows reseeding within 48 hours.

Prepared in cooperation with Crops Research Division, Agricultural Research Service, United States Department of Agriculture, Beltsville, Maryland.

DRAWING BY REGINA HUGHES, USDA, BELTSVILLE

preventative program by making application before many mites have become adults. It is compatible with most insecticides and fungicides.

Combination Sprays

Phosphatic insecticides, as additions to oil sprays, are becoming widely used for insect control on trees and shrubs. Data from recent tests show that these combinations provide control equal or superior to the straight oil sprays while retaining the advantages and minimizing the disadvantages of both. In combination sprays the materials are used in concentrations approximately one half that when used alone. Combinations of ethion and insecticidal oils have given outstanding results under a variety of conditions.

Phytotoxicity

Plant injury caused by horticultural sprays has been observed in a few instances. Since injury occurs following application of some sprays to certain rose varieties and does not injure others, for example parathion, it is suggested that information on phytotoxicity be obtained from local sources such as county agents.

There is considerable evidence which indicates that plants growing under dry conditions are more susceptible to injury from sprays. In a number of instances the amount of plant injury observed correlated very well with the turgid condition of the foliage. Plants to be treated with pesticides should have ample soil moisture available several days prior to treatment.

Low Limbs Hurt Grass Growth

Although all grass needs light, it is often not necessary to remove trees to get enough light in shady areas, a scientist at North Carolina State College reports. Dr. John H. Harris recommends removing limbs up to a height of 10 feet or more to allow light to come through.

Various types of grass are suggested by Dr. Harris. Zoysia Matrella is preferred for light soil, Tiflawn and Tifgreen when the grass is to be planted in the spring, and red fescue or bluegrass when planted in fall.

"Let's Go National," Delegates Urge at Florida Spraymen's 3rd Annual Meeting

If 1963 really brings the "coming of age" of contract spraying, as has been predicted, an energetic organization in Florida may be one of the reasons.

Meeting at Miami Beach's Deauville Hotel, Nov. 8-10, nearly 200 delegates to the third annual Horticultural Spraymen's Association of Florida convention made some momentous decisions, and heard predictions which touch on the very future of the industry.

In a series of packed sessions they:

(1) voted to concentrate on becoming a national association;

(2) met with state health officials to plan forthcoming legislation which will enhance the professional status of Florida's 900-plus spraymen;

(3) heard top-echelon scientists enlarge the group's understanding of basic technical problems; and

(4) held panel discussions,

Post-lecture confidences were exchanged by economist Dr. Grover A. J. Noetzel (left) and veteran sprayman Charlie Johnson.

elected officers, and still found time to frolic in the South Atlantic sun and engage in a sumptuous social program.

To top it all off, several speakers dwelt on the current antipesticide issue, and advised contract applicators to put this new public demand for skilled application to work for the industry.

Need for National Assn. Cited

HSAF already has members from as far away as New York and Puerto Rico, and has had inquiries about the organization from such diverse spots as Texas and Ohio. This year, delegates actually travelled from as far away as North Carolina to join in the education and fun.

Family affair. Registration was handled by this able trio (left to right) Cindy, Barbara, and Harvey Mast who, with cousin Roger, help run Masts' Complete Lawn Service in Lake Worth. Elberta Newell, Tom Hamall's able publicity assistant, was one of the first to register.

Sensing the need for some kind of national unity in the thriving weed control and turf spraying business, the hard-working members laid their plans on the board.

"Let's go national," they said.

They also voted to invite *Weeds and Turf* to act as the group's official news outlet.

This significant decision to go national followed on the heels of a no-holds-barred address from John A. Mulrennan of the Florida State Board of Health.

Mulrennan says that however much our free-enterprise instincts may revolt against legislation, our civilized notions make us realize that certain rules are necessary.

It is Mulrennan's intention to draw up legislation which will spur Florida spraymen to even greater concepts of professionalism.

"There is no group of professional people I know of which has made the progress this group has made in the last three years," Mulrennan said to his enthusiastic audience.

Another member of the Florida Board, entomologist Frank Wilson, addressed the group Friday on how to determine quality of emulsifiable concentrates, formulations so vital to the sprayman's interest.

In emulsifiable concentrates, the formulation should consist of globules as small as possible, Wilson said, and the mixture should remain stable. There are several ways to test quality of these emulsifiable concentrate formulations.

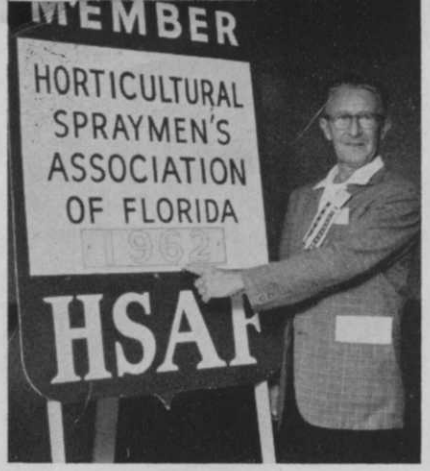
One such test is the "settling" test, in which one tablespoon of concentrate is mixed in a pint of water, and placed in a water-tight jar. This jar is then shaken 10 times.

Then duplicate the procedure for the chemicals to be compared for quality of formulation. Set the jars side by side, and watch for visible settling or layering at 5, 10, 15, and 30-minute intervals.

Any material which shows layering or settling within 5 minutes should be considered unsatisfactory, the scientist maintains.

Another easy check is simply

In deep thought, Florida health official John A. Mulrennan (left) studied pending spraymen's legislation with HSAF president Larry Nipp.



Proud of the past year, hopeful for the new is HSAF's energetic publicity director Tom Hamall.

to compare globule size of various compounds under the microscopes which spraymen are buying in increasing number.

Smaller the globule, better the product, Wilson claims.

Willson Man Rates Rachel

Back for the second time at HSAF conventions, William J. Wiswesser, Director of Industrial Hygiene for Willson Products, joined in the discussion of the new uproar about chemicals and their importance.

Wiswesser's friendly, easy delivery did not detract from the importance of what he had to say.

People who capitalize on public gullibility for pseudo-scientific facts, especially when motivated by profit, are "intellectually dishonest," Wiswesser said forcefully.

He cited industry safety records, and recommended that spraymen be properly masked when delivering toxic sprays and dusts.

Make Money, Economist Urges

There's no shame connected with making profit, although the way some people run their small businesses you'd think they're afraid to be in the black, Dr. Grover A. J. Noetzel, Dean of the Department of Economics, University of Miami, told HSAF conventioneers. Dr. Noetzel, a world-renowned industrial consultant and business advisor, delivered some "equations for small business" which should help contract applicators make more money.

Our entire free enterprise system is based on the profit motive, and there's no reason to feel altruistic about it.

Dean Noetzel told spraymen to examine their accounts closely, single out which ones are losing money, and get rid of them, regardless of other factors. These revenue-sappers have to go. He hinted that they might be referred to competitors, but his tone was in jest.

Noetzel suggested holding down the rate of expansion, because small businesses can sometimes grow too fast for their own good. He recommended CAs stay away from high-cost financing.

Mainstays in HSAF's operations are these three charter members (left to right) Bill King, Ted Kaplan, and Dan Van Volkenberg.

Chinch Bugs Outwit Science

"Bugs are winning the war with mankind, and they're still winning the war with plants."

This challenging opener from Dr. Roy A. Bair, agricultural consultant from West Palm Beach, was a fitting attention-getter for the assembled spraymen, many of whom had been perplexed by mounting public criticism of pesticides.

In his evaluation of lawn grasses, the Palm Beach expert said researchers are far from developing the "perfect" lawn grass which would be resistant to insects, disease, and weed infestations.

But while man hasn't outwitted these turfgrass scourges, insects like the chinch bug have progressed in their adaptation to spraymen's efforts to destroy them.

"Bitter Blue St. Augustine grass got its name because chinch bugs supposedly wouldn't touch it because of its bitter taste," Dr. Bair observed, "but in time the insects developed a strain which relished the new grass."

Similarly, resistance to DDT and parathion cropped up time and time again among the prolific chinch bugs, now reported to be moving into the North and Midwest.

In a nutshell, this means contract applicators have to keep up to date on all the new weapons industry and research now offer, if insects, diseases, and weeds are to be controlled.

"Professional spraymen must become conversant with all aspects of varietal adaptability and requirements of grasses for specific soil types, watering procedures, fertilizing, mowing, and renovating," Dr. Bair concluded.

A fiery rebuttal of irresponsible antipesticide books was delivered by agricultural consultant Dr. Roy A. Bair (left), who stopped to compare notes with entomologist James Brogdon.

More Chinch Bug Data

Some writers say the chinch bug spurred Florida spraymen in their unique growth to a $25,000,000 industry, and Florida Extension Service Entomologist James E. Brogdon dwelt at length on this famous lawn devastator.

While new, unconventional control methods have been directed against the chinch bug in Florida, Brogdon said, few of the new techniques show promise.

Chemosterilization, control with a fungus, and introduction of certain nematodes have all failed to significantly reduce chinch bug populations.

Chemical control, in the final analysis, is still the bulwark of the CA's attack on chinch bugs. Materials now commonly used include Trithion, Ethion, VC-13, and Diazinon, Brogdon commented. Parathion was once a favorite, but this relatively hazardous chemical is losing favor among some applicators.

Studies made this year indicate several chemicals not now used on the grass-hungry insects may

prove effective weapons. Brogdon cited ASP-51 and Zytron as chemicals offering "excellent control at 10 lbs. active ingredient per acre." Dow Chemical, manufacturer of Zytron, has not registered its product for chinch bugs, Brogdon pointed out, but interest in this registration is indicated.

Five other experimental materials were tried, and found very promising, Brogdon said. These products, still in the testing stage, are Bayer 39007, Shell SD-7438, Stauffer N-2788, American Cyanamid 47300, and Ortho 5305.

Brogdon also recommended products for other lawn insects. Sod webworms and armyworms have been satisfactorily controlled with toxaphene and Sevin, he revealed.

Ethion has also been a good control for these lawn caterpillars.

Sevin, Toxaphene for Sod Webworms

For sod webworms specifically, Brogdon suggested 3 lbs. of 40% toxaphene wettable powder or 1½ pints of 60-65% toxaphene emulsi-

Looking at *Weeds and Turf* after delegates voted to make it HSAF's official news outlet were Lewis Maxwell (left) and sprayman Bill Murray, vice president of the group.

fiable concentrate, or 2 lbs. of 85% Sevin Sprayable (3½ lbs. of Sevin 50W) per 100 gallons of water.

Turf should be wet thoroughly, using at least 5 gallons of spray per 1000 sq. ft.

Mole crickets can be combatted with aldrin or heptachlor at about 4 lbs. active per acre, or chlordane at 10 lbs. active per acre.

Aldrin, heptachlor, or chlordane were also recommended for control of white grubs.

For millipedes, Brogdon concluded, we've suggested Diazinon or Sevin, as well as BHC or lindane.

As contract lawn spraying comes more and more into its own, and takes its rightful place among America's major service industries. applicators in increasing number are helping experiment stations with research projects.

Microscopes, Labs for Testing

Armed with microscopes, small laboratories, and test plots, these progressive firms are contributing significant experimental data to fulltime turfgrass researchers.

But all too often, data so gathered is not useful because haphazard experimental techniques are employed.

How to avoid this waste of important information was the subject of Dr. Stratton H. Kerr from the Florida Agricultural Experiment Station in Gainesville.

Dr. Kerr has some simple steps which CAs can take to insure a uniformity in experimental approaches. He outlined these steps as follows:

(1) In test plots, use side by side treatments as much as possible. When chemicals are compared on widely separate turf areas, variables of undetermined nature can cause different results, so that no real, valid comparison of chemicals is possible.

(2) When comparing one pesticide with another, run the tests several times. Dr. Kerr recommends a minimum of four lawns be tried before results can be evaluated seriously.

(3) Get an accurate estimate of which insects are present, and how many are there. Counts should be taken at 2-, 4-, and 6-week intervals.

(4) CAs should be sure to keep a thorough record of the entire test procedure, which includes dates of application, dosages used, weather conditions, and other variables.

If these simple steps are followed, Dr. Kerr predicted, spraymen can contribute significantly to the quest for new and better pesticides. Frequently the CA can offer more valid data because he has applied chemicals on a commercial basis under conditions which spraymen face in day-to-day jobs.

CAs have to be specialists in diverse fields, even to controlling lawn diseases, so Thursday's ad-

Popular speakers at the '62 convention were Dr. R. S. Mullin, plant pathologist (left), and nematologist Dr. James Winchester (center), who paused to talk with panel moderator Ralph White, president of the Fla. Turfgrass Assn.

dress by Dr. R. S. Mullin, Extension Plant Pathologist at the University of Florida, Gainesville, was a welcome one.

Turfgrass disease control is too complex a subject to be covered completely in a single address, or even in a single article like *Weeds and Turf*'s recent feature on these grass destroyers (November, W-1).

But Dr. Mullin distilled his facts, and presented the delegation a heady brew which is sure to upgrade their professional knowledge.

Spray Fungicides Under Leaves

One important thing, which is relatively simple and frequently overlooked, is adequate coverage when using a fungicide. Dr. Mullin said to be sure to cover the entire plant, including undersides of leaves, which may be particularly vulnerable to disease infection.

Dr. Mullin cited a new influx of roses into Florida, and cautioned CAs to beware of black spot and leaf spot which may attack these time-honored blooms. Eventually, CAs will get more and more calls

Exchange of ideas come from this trio with mixed backgrounds (left to right), Frank Wilson, whose special field is applied entomology, Pierre Nobs, Florida sprayman, and W. J. Wiswesser, chemist and safety expert from Willson Products.

Congratulations! Walter Ferguson, new HSAF president, was warmly rewarded on his election by wife Shirley.

to control diseases on ornamental plants such as these. For black spot and leaf spot, Dr. Mullin recommends Thaltan.

Nematodes, Eyeless Creatures, Abound in Countless Numbers

From the Florida Everglades Experiment Station, nematologist James Winchester brought a valuable dossier on nematode control.

Nematodes are eyeless creatures which are selective in feeding, sticking with a single host, or type of host, even from generation to generation.

They're much too small to be seen with the naked eye, but a Mr. Magoo will readily detect the damage these sightless scourges wreak.

Dr. Winchester dwelt on several species of particular concern to spraymen.

One of these is the sting nematode, which has been controlled with Nemagon, using 1 pt. per 700 square feet.

Fumazon and VC-13 are also good nematocides, it was said.

More Nematology

Florida spraymen are sufficiently worried about the nematode to devote two separate sessions on the program to this elusive, mysterious pest. Dr. A. A. DiEdwardo, University of Florida Experiment Station nematologist, presented a series of color slides, and elaborated on the information Dr. Winchester had just delivered.

DiEdwardo is particularly concerned with a new species of cyst nematode which attacks turf grasses with drastic results. The tiny pest causes a reduction in root systems so that the plants don't get enough iron.

In this case, he said, treating with an iron chelate is highly successful.

This year's technical program was rounded out by a general talk on ornamental maintenance by Charles Tucker, technical consultant of the General Spray Service, Inc., Katonah, N.Y.

Most homeowners don't understand how to water lawns, and they handle fertilizer in a fashion which can be described at best as haphazard, the young scientist quipped.

This simply means more business for the contract applicator in the future.

Panel of Pros

Perhaps the most popular feature of the Floridians' superbly planned convention was a question and answer period at the end of each day's events.

Speakers from the day's program were lined up before their audience, and members were invited to fire away on what needs to be known.

Questions from the floor were directed at Dr. Stratton Kerr who told delegates how to conduct test plots of turfgrass.

Questions came fast and furious.

Check Nematodes on Jobsite?

What on-job inspection can we use to determine whether nematode infestations are causing trouble? one delegate wanted to know.

Dr. DiEdwardo replied it is difficult to check these things in the field, but recommended CAs treat a small test plot with a nematocide. If the lawn ailment clears up, it's safe to go ahead and treat the rest of the defective sod.

"Do you get good control of turf diseases with one application of Velsicol's Emmi?" a sprayman asked. Dr. T. E. Freeman, plant pathologist at the University of Florida, replied that sometimes one dose will do if the disease is not too advanced, but he usually recommends two, spread 14 days apart.

This practical question-and-answer period was moderated with zest by Ralph White, Technical Director of Ousley Sod Co., Pompano Beach. White is president of the Florida Turfgrass Association.

The fact-finding panel made a fitting close to the lecture series, and lead the energetic conclave into their business meeting, during which they elected new officers and heard committee reports.

Ferguson New Prexy

Delegates moved Walter E. Ferguson into the top Florida post. Ferguson, who runs Ferguson Lawn Service in Winter Haven, will be a key man in the group's efforts at nationalization.

Under present organization, there are three regional vice presidents. William Murray, of Greenlawn Spray Service, Lake Worth, is new vice president for the Central Region. Representing the Northern Region will be William King of King Landscaping, Orlando. Alan Morgan, Hill and Harris Power Spraying, Ft. Lauderdale, will be vice president for the Southern Region.

New Directors at Large are Thomas Hamall, Bow Arrow Gardens, Miami, and Daniel Van Volkenberg, Lawns, Inc., St. Petersburg.

Next year the group will meet in Orlando, State Publicity Director Thomas Hamall told *Weeds and Turf*. Dates and specific spot will be announced later. Anyone wanting more information about the convention or HSAF plans to go national may write Hamall at 3291 N. W. 103rd St., Miami, Fla.

Convention success was attributed by retiring president Larry Nipp to Lucy Renault, program chairman.

—W & T Mailbox—

Perturbed . . . for a moment

After seeing the first few copies of the new *Weeds and Turf*, I was somewhat perturbed by the seemingly casual approach to this type of work. However, your warnings and recent cautions to new applicators are very timely and to the point. You have pointed out some of the hazards of weed control and they should not be taken lightly.

For the past 10 years, a large percentage of our volume has been from weed and grass control for oil and related industries. Our experience with pre-emerge chemicals led us into the field of lawn weed control and for the past two years, we have concentrated on this area. This has had its problems.

Perhaps, Problem No. 1 has been the porosity of the soils that we have to work with. Clay soils seem to give us the most trouble. Sandy soils do not hold the materials well enough to get the proper control. There also seems to be a correlation in the pH of the soils and combinations of different herbicides we have used.

We have had problems in the application of liquid fertilizers. We do not get the quick "bounce" in the grasses that we had expected. We ran some tests on the addition of an iron chelate and that is not complete, but will let you know what our tests prove.

In view of these problems, I would strongly urge that any operator approach this new type of business with extreme caution; a bad job and a ruined lawn will cause a great deal more grief than the monetary benefits will take care of.

I am proud of you for publishing this magazine for us.

Tom Graham

Graham Pest Control Garden Clinic
Oklahoma City, Oklahoma

Weeds and Turf welcomes expressions of opinions from its readers. Send ideas and comments briefly as possible to Charles D. Webb, Editor, Weeds and Turf, 1900 Euclid Ave., Cleveland 15, Ohio.

Clear Downed Elm Wood Fast To Halt Dutch Elm Disease

Quick cleanup of branches broken off trees by windstorms, or felled through other means, was urged recently by Iowa State University entomologist, Harold Gunderson.

If downed elm wood isn't cleaned up by the middle of August, Gunderson said, the bark beetles that spread Dutch elm disease will begin laying eggs in the debris. Result will be an increased beetle population for 1963, and more chances for widespread Dutch elm damage.

Gunderson said it is important also that people recognize that no spraying treatment gives 100% protection. In elm trees 60 to 110 feet tall, for example, it's quite possible that at least one crotch won't receive enough insecticide to protect against bark beetle feeding in the spring. And one feeding beetle can infect a healthy tree.

Gunderson said spraying elms under *ideal* conditions during the dormant season, with a proper mixture of DDT, will give 95-99% protection. Methoxychlor used under similar conditions will give 93-96% protection.

Where elms grow very close together, Gunderson explained, it's possible for Dutch elm disease to be transmitted through root grafts. When this happens, spraying offers no protection whatever.

Trees infected with Dutch elm disease show in the early stages a yellowing and wilting of leaves on water sprouts along the trunk or on one or more branches at the treetops. Elm leaf beetle larvae feed on the underside of leaves, causing a skeletonizing effect.

Another control recommendation for combatting the ailment comes from David Matthew, Purdue University extension entomologist. He says severe infestations may be controlled by spraying the trees with DDT at ½ pint 25% emulsifiable concentrate or ¼ pound 50% DDT wettable powder per 25 gallons. Lead arsenate may be used at 1 pound, plus ¼ pint of summer oil, per 25 gallons.

Sol-Kraft Grows, Relocates

Sol-Kraft, Inc., American distributor of West German Solo small engine equipment, is moving into new and larger quarters at 37-41 57th St., Woodside 77, N.Y. New facilities will feature offices, an enlarged stock room, and increased warehouse facilities.

Literature *you'll want . . .*

Here are the latest government, university and industrial publications of interest to contract applicators. Some can be obtained free of charge, while others are nominally priced. When ordering, include title and catalog number, if any. Sources follow booklet titles.

The Biology and Control of Turf Grubs, Research Bulletin No. 829, 1959, Ohio Agricultural Experiment Station, Wooster, 15¢

Improving Athletic Field Turfgrass, Product Use Bulletin No. 2, 24 p. il., West Point Products Corp., West Point, Pa.

Chlorobenzilate to Control Mites on Ornamentals, Technical Bulletin No. 62-1, 8p. il., Geigy Agricultural Chemicals, P.O. Box 430, Yonkers, N.Y.

Diseases and Other Disorders of Turf, Circular 208 (Revised), April 1962, 11 p. il., Connecticut Agricultural Experiment Station, New Haven.

Lawn Diseases and How to Control Them, Home & Garden Bulletin No. 61, 16 p. il., Office of Information, U.S. Department of Agriculture, Washington 25, D.C., 25¢

Chemical Control of Diseases Affecting Turf on Golf Greens, Processed Series P-422, June 1962, 11 p. il., Oklahoma State University Experiment Station, Stillwater.

Control of Crabgrass and Other Weeds In Turf, Bulletin 649, April 1962, 18 p. il., Connecticut Agricultural Experiment Station, New Haven.

Better Lawns: Establishment; Maintenance; Renovation; Lawn Problems, and Grasses, Home & Garden Bulletin No. 51, Office of Information, U.S. Department of Agriculture, Washington 25, D.C.

Controlling Insects on Flowers, Catalog No. A 1.75:237, 80 p. il., Superintendent of Documents, Government Printing Office, Washington 25, D.C., 40¢

Fall Renovation of Greens and Fairways, Product Use Bulletin No. 3 (Revised), August 1960, 48 p. il., West Point Products Co., West Point, Pa.

Herbicide Recommendations for Common Lawn Weeds, Home & Garden Bulletin No. 59, Office of Information, U.S. Department of Agriculture, Washington 25, D.C.

Trimmings

Lucky Pierre! We had a chance to renew some old friendships at the recent Florida Spraymen's Convention, and were particularly happy to talk with Pierre and Winnie Nobs, who run Northwest Power Spraying in Miami. These two genial Floridians have three sons and a daughter who're a great help to their folks in running the business. So much help, in fact, that the family seems to have plenty of time for their favorite sport, sailing. Pierre's "Raven" class sailboat is a well-earned weekend retreat for the Nobs after five days of hard work! Any readers in New York, Chicago, or other spots in the frigid zone want to join us in a mass exodus to Florida?

* * *

On the bandwagon. **Two tarheel PCOs, who also spray lawns, traveled several hundred miles to join in this year's HSAF Convention. H. E. Frye of Frye Exterminating, Raleigh, N.C., and Ivey Coward, of Ivey Coward Co. in Greenville, have both added complete lawn spraying services to their thriving firms. Both North Carolinians said they welcomed a chance to come to the Miami Beach convention after they read about it in *Weeds and Turf*. No better way to keep abreast of new developments and have a ball at the same time!**

* * *

Sadler Cinches Chinches. Another PCO who takes care of large turf areas is Charles Sadler who runs Bruce-Terminix in Houston, Tex. Among other large and small contracts, Charlie treats the local Coca-Cola bottling company lawn for fertilization as well as control of chinch bugs, other insects and diseases. This versatile Texan says chinch bugs are reported in increasing frequency in the Panhandle state!

* * *

Rootin' Teuton. **One safety expert who's always on the sprayman's side is Willson Product's W. J. Wiswesser, a frequent speaker at CA meetings. Bill says his name, in the original German centuries ago, meant "water spreader," or something of the sort, so he feels a special kinship with applicators who frequently find lawn irrigation among their contracts. Besides being a foremost advocate of safe practices, this Reading, Pa., industryman is now collecting all newspaper and magazine articles which resulted from certain recent antipesticide volumes. It's a winning project, because the knowledgeable are on the spraymen's side, Bill says happily!**

* * *

Man of the Year. Charlie Johnson, whose spraying business is in Miami, was honored during the recent HSAF convention as "Sprayman of the Year." At the annual banquet, Charlie beamed graciously while the conventioneers applauded this pioneer in the Florida organization. We join in congratulating this Grand Man of Miami, and wish him many more years of active service!

* * *

Sprayman's Pal. **We just had a letter from Southern Weed Control Conference Publicity Chairman James M. Brown. Jim says this Jan. 16-18 meeting in Mobile, Ala. is packed with sessions aimed at contractors. Included are talks on horticulture, industrial sites, and aquatics. We'll have a complete advance on this conference next month.**

Canadian Town Reports Numerous Dew Worms Becoming a Problem

Reports from Lethbridge, in Alberta, Canada, indicate that dew worms have noticeably affected nearly half the lawns in the city. Although the damage is not excessive in many lawns, chemical treatment has been used in some areas.

Lead arsenate and chlordane have been effective in controlling the dew worms, reports state, although control measures usually have to be repeated each year as the worms reinvade the lawns from adjacent areas. Recommended dosage of lead arsenate is 1-2 lbs. per 200 sq. ft.

Before applying the chemicals, lawns should be allowed to dry out for about a week, Phil E. Blakeley, information officer at the Lethbridge Research Station, recommends. When applied, the chemicals should be watered well to reduce hazards to animals and humans.

Gandy Markets New Disc-Mount Granular Pesticide Applicators

Applying granular chemicals and incorporating them into the soil can be combined in one field operation with the new Disc-Mount Applicator introduced by the Gandy Co., the firm announced recently. The Disc-Mount was developed to apply soil insecticides that must be disced-in immediately to make them effective or to preserve the potency of the chemical, and to apply weed control chemicals that require soil incorporation, the firm says.

Another development announced by the company is the "Lo-Hi" for broadcast or band application of granular chemicals. Gandy recommends this machine for broadcasting soil insecticide granules on the soil surface during late winter or early spring.

CAs interested in more information on the applicators may write Gandy Co., Owatonna, Minn., for introductory brochures.

Study Nematode Control in Iowa

Nematodes, small, round soilworms that attack underground plants, are being studied carefully at Iowa State University, Don C. Norton, plant pathologist, announced recently. Control measures are being directed mainly at developing long-range methods of control, he said.

In an article in the July issue of *Iowa Farm Science*, Norton points out that nematodes, once thought to be mainly a warm-climate problem, are now known to be active even in northern parts of Iowa.

More information about nematodes is in the complete *Iowa Farm Science* article. CAs can get copies of it, Reprint #FS-975, from Publication Distribution Room, Morrill Hall, Iowa State University, Ames, Iowa.

Meeting Dates

North Central Weed Control Conference, Hotel Lowry, St. Paul, Minn., Dec. 3-5.

Northeastern Weed Control Conference, Hotel New Yorker, New York, N.Y., Jan. 9-11, 1963.

Southern Weed Control Conference, Admiral Semmes Hotel, Mobile, Ala., Jan. 16-18.

California Weed Control Conference, Santa Barbara, Jan. 22-24.

Aquatic Weed Control Society Annual Meeting, LaSalle Hotel, Chicago, Ill., Feb. 12-13.

Use Herbicidal Oil for Neat Lawn

Spraying a band of herbicidal oil around plants and along the drive and walks will give a lawn a neat, trim appearance, Dr. Neil G. Odenwald, horticulturist at Louisiana State University Extension Service, recommends.

Used to kill weeds and grasses, herbicidal oil is a petroleum product that penetrates and kills young plant tissues, Dr. Odenwald points out. It is available under such names as Esso 38, Cities Service-No Weed Oil No. 1, and Varsol.

Three or four applications will usually keep the weeds and grasses down.

"Never spray on the leaves of desirable plants or on the trunks of trees or other large woody ornamentals," Dr. Odenwald cautions CAs, "since the oil will kill all tissue it contacts."

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WEEDS and TURF

Directory

of 1962 ARTICLES

An alphabetical reference to subjects and titles of all major feature articles, feature columns, news stories, letters published in *Weeds and Turf* in 1962. A list of authors of this year's articles follows the Directory on page W-15.

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Attack on Aquatic Weeds Begins At University of California

A new research team at the University of California is investigating submerged plant life, seeking more effective and less expensive control measures.

California's 50,000 miles of irrigation ditches, 10,000 miles of drainage canals, and thousands of farm ponds and lakes could be threatened by aquatic weeds such as the free-floating, brush-shaped "coon-tail" and the bottom-rooted pondweed, a university report noted.

The research team, one of four in the nation recently set up in state agricultural experiment stations with federal funds, is cooperating closely with the Bureau of Reclamation and the California Fish and Game Department so the programs will be mutually beneficial.

Lead Arsenate Kills Webworm

Mimosa webworm infestations, found in trees such as pecan, walnut, persimmon, and locust, can be controlled with a spray of 4 lbs. lead arsenate to 100 gallons of water, Dr. M. E. Gardner of North Carolina State College reports. He notes the same spray will also control the bagworm.

Webworm infestation can be recognized by rolled and webbed leaves, a result of the webworm's feeding operations. Affected leaves then brown, and their food manufacturing functions are destroyed.

Where spraying is impractical, Gardner recommends pruning out the limbs anchoring the tent houses, or destroying the tents with a long pole. Another method is to tie a rag ball to the end of a pole and saturate it with kerosene oil. Ignite the oil and carefully burn out the webs with quick thrusts of the flame, being careful not to damage the plant tissue.

Diquat Gives Capeweed Control

Diquat spray has been successful in eliminating Capeweed from some heavily infested paddocks in Busselton, Australia, reports M. Cullity, superintendent of dairying in the Department of Agriculture there.

Pests on Flowers Guide Ready

A new pamphlet from the U.S. Department of Agriculture, "Controlling Insects on Flowers," gives descriptions, and in many cases pictures, of insects that attack flowers.

Control measures for each insect, as well as a chapter on using insecticides and mixing sprays, are also included.

The pamphlet, Agricultural Information Bulletin No. 237, is available from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., for 40 cents.

City Bills Weed Control to RR

Failure to initiate a weed control program along a right-of-way, after repeated requests from city officials, brought a New Jersey railroad a bill for $180.

City officials in Elizabeth, N.J., report that they authorized a public works crew to eliminate the growth when the Jersey Central Lines failed to comply with requests to do so, and billed the railroad for the work.

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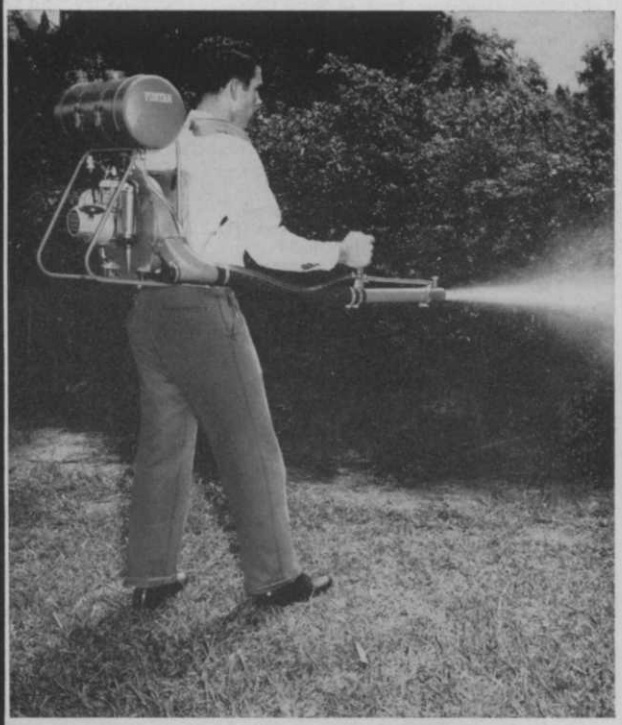

THE R.5 FONTAN FOR HEAVY DUTY WEIGHT 37 LBS.

A self-contained unit, the Fontan has jets to interchange for misting or spraying, another attachment to interchange for dusting. Designed for versatility, dependability and safety, the Fontan has metal frame and padded straps for comfortable operation.

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The Fontan adjusts to allow low-volume spraying with less dilute liquid and a higher concentration of Malathion or other chemical. Both Fontans offer complete portability, choice of droplet size, easy maintenance, safe fuel injection, corrosion-resistant plated parts.

THE R.6 FONTAN FOR SMALLER JOBS WEIGHT 24 LBS.

A torch interchanged with the spray head and nozzle converts either Fontan into a flame thrower for weed killing, snow removal, burning off paint, heating tar for roofs and street repairs, and numerous similar tasks.

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